Communication

Hood Canal Bridge Project Team

The ultimate goal of the Hood Canal Bridge team is to administer a world-class project to replace the Hood Canal Bridge. Meet one of the people who make it all happen.

Cass Bruneau, *Kiewit-General Pontoon Project Engineer, Hood Canal Bridge Team*

Cass Bruneau plays a key role in the success of the Hood Canal Bridge Project as Kiewit-General's Pontoon Project Engineer. He brings years of experience and expertise with him from working on many large and complicated bridge and highway projects. While in Salt Lake City, Utah, he worked as a project engineer, replacing 17 miles of freeway and 140 bridges. Cass also worked in Denver, Colorado on a $1.3 billion dollar multi-modal project as a project engineer and structures superintendent. This project included replacing 14 miles of freeway, adding new bridges, tunnels and a light rail line. In addition, he worked for two years as an estimator/project manager on a design/build project.

Cass's career began with Kiewit-General in October 1993 as the field engineer on the Black Lake interchange project constructing three new bridges on US 101. Cass began working on the Hood Canal Bridge Project in September 2003. Now Cass plays a large role in the oversight of pontoon engineering, scheduling, costing, reporting and forecasting as well as the oversight of post tensioning, survey control, request for information (RFI) and request for change processes (RFC).

Cass's favorite activities outside of work include spending time with his wife Carol, son Cade (5 years old) and daughter Carissa (3 years old). He says that since his children are a little older, the whole family is able to go hiking and exploring near their home on the Olympic Peninsula. Cass is a self-declared news junkie, always keeping up with the current world events. When given the chance to sit down and relax, he likes to indulge in reading about architecture and fine wood working. He hopes to someday be involved with custom home building. His favorite TV shows include *Extreme Engineering* and *Modern Marvels.* Is it any wonder we have him on our team?

Project Responsibilities: Pontoon engineering, scheduling, costing, reporting and forecasting, oversight of post tensioning, survey control, RFI and RFC processes.

Questions? cass.bruneau@kiewit.com or (253) 439-6173

Next Month's Activities

- Pour the final top deck, or lid, concrete for pontoon PA
- Complete the first of three top deck concrete pours for pontoon Q
- Pour the first of two top deck concrete sections of pontoon PB
- Continue post tensioning on pontoon PA
- Finish last wall pour for this cycle of pontoon construction
- Begin modifications to the graving dock in preparation of cycle two pontoon construction
- Build wood wall panels for cycle two pontoons
- Assemble rebar walls for cycle two pontoons
- Project update to Peninsula Regional Transportation and Planning Organization

October Monthly Report...

Building Pontoons in a Graving Dock

A "graving dock" is a large dock from which water can be pumped out. It is traditionally used for building ships or for repairing a ship below its water line. Find out why this special kind of dock is the best facility for constructing pontoons and learn how the graving dock works.

Hood Canal Bridge Retrofit and East-half Replacement Project

East-half Replacement
Completion Goal: 2009
West-half Retrofit Completion Goal : 2010

Q. Where is the bridge?

A. The Hood Canal Bridge is located between Kitsap and Jefferson counties at the northern mouth of the Hood Canal.

Q. Why is it important?

A. It serves as a vital economic and social link between the greater Puget Sound and the Olympic Peninsula.

Q. What is WSDOT doing?

A. The Washington State Department of Transportation is improving this lifeline by replacing the east-half floating portion of the bridge, replacing the east and west approach spans, replacing the east and west transition truss spans and updating the west-half electrical system. The project completion estimate is 2010.

Q. What can drivers do to stay informed?

A. Sign up to receive the latest news regarding the Hood Canal Bridge Project and other related area transportation news in your e-mail inbox. Visit www.hoodcanalbridge.com to subscribe.

This report highlights updated Hood Canal Bridge Project information from **August 1–31, 2006.**

For more information about the Hood Canal Bridge Project visit the project web site, **www.hoodcanalbridge.com,** or contact project staff:

Becky Hixson, *Communication Manager,* (253) 305-6450, hixsonb@wsdot.wa.gov

Eric Soderquist, *Project Director,* soderqe@wsdot.wa.gov

Washington State Department of Transportation

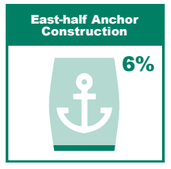
EAST-HALF REPLACEMENT COMPLETION GOAL: 2009
WEST-HALF RETROFIT COMPLETION GOAL: 2010

Monthly Report

August 2006

Anchor construction at Todd Pacific Shipyards in Seattle: *(Left) Ironworkers weld together new dry dock access ramp, August 18, 2006. (Center) Carpenters build wood forms to use in anchor mockup (model) construction, August 18, 2006. (Right) Floating dry dock moves into place, August 22, 2006.*

Project Delivery



Anchor Construction

On August 22, the floating dry-dock, Emerald Sea, was towed into place at Todd Pacific Shipyards in Seattle. The process took about 25 minutes and was captured on the newly installed anchor construction Web camera. With the dry dock in place, work is moving forward quickly to complete 20 new east-half Hood Canal Bridge anchors.

During August, WSDOT and Kiewit-General (K-G) crews began access ramp construction, conducted a hazard assessment of the site, developed and posted specific site safety regulations, received necessary environmental permits, completed an anchor mockup exercise showing preferred work techniques, fenced the site and began assembling wood anchor forms. WSDOT also hired three new staff members who are focusing on anchor construction. This month's accomplishments were the first steps toward setting the new east-half anchors on the bottom of Hood Canal by the end of next summer.

Hood Canal Bridge East-half Anchors

Diameter	Number	Weight for Each*	Total weight*
46 feet	12 anchors	995 tons (1,989,400 lbs)	11,940 tons
56 feet	7 anchors	1,328 tons (2,655,140 lbs)	9,296 tons
60 feet	1 anchor	1,385 tons (2,769,660 lbs)	1,385 tons
TOTAL	**20 anchors**		**22,621 tons**

**When empty*

Schedule

Anchor construction will be accomplished over two phases with ten anchors being built during each phase. The first phase is scheduled for August 2006 to February 2007. The second phase estimated construction dates are March 2007 until late July 2007.

Project Delivery continued...

Each 29-foot tall anchor will take five concrete pours to complete:

Pour # 5: Upper spokes inside the anchor

Pour # 4: Final 11 foot upper anchor wall section

Pour # 3: Fourteen-foot lower wall section, which includes setting in pipe and teardrop anchor cable openings

Pour # 2: Two-foot high base slab section

Pour # 1: Two-foot tall lower spokes and anchor footing section

Casting the anchors in two phases keeps anchor construction and the overall project on schedule. It also allows the crew to work efficiently by reusing material from the first phase during the second phase.

Anchor Facts...

- *Anchors are large, concrete, bowl-like structures that sit on the bottom of Hood Canal and keep the Hood Canal Bridge from moving side to side.*
- *The anchors are connected to the bridge by long, steel anchor cables.*
- *Each empty anchor weighs more than 1,000 tons, equivalent in weight to about 167 adult male African elephants.*
- *Total weight of all 20 anchors (when empty) is almost 2.5 times the weight of the Space Needle.*
- *Each anchor is the same height as a two-story building.*
- *If all 20 east-half anchors were stacked on top of each other, they would be almost as tall as the Space Needle.*

Accountability

Pulling it all together

Kiewit-General and WSDOT began post tensioning on Wednesday, August 23, tightening the first of approximately 2,500 steel cables and rods that run through pontoon PA walls, floor and top. Post tensioning is the largest portion of work left to be complete before the first cycle of pontoons are ready to be floated from Tacoma to Seattle. Accomplishing post tensioning within the allotted timeframe and projected cost is critical to the project's overall schedule and budget. Extensive planning was completed and training conducted prior to post tensioning to make sure this work would be done right.

Post tensioning, tightening up steel cables and rods that run through the pontoons in three directions, is used to increase the strength of these concrete structures. Concrete is strong when something pushes on it but weak when something pulls on it. This means that without the added strength of steel rebar and post tensioning, the forces from waves, wind, tides and heavy traffic would eventually pull the concrete apart.

When a pontoon is post tensioned, the steel cables and rods within the pontoon walls pull inward. Three kinds of post tensioning are used on the Hood Canal Bridge pontoons: longitudinal (along the length of a structure), transverse (from side to side) and vertical (from top to bottom). Once the pontoons are all post tensioned together, they will stay in place and keep their shape.

The Post Tensioning Process

The crew post tensions small sections of the pontoons at a time, following a sequencing pattern that distributes the load, or pressure, on the concrete evenly throughout the post tensioning process.

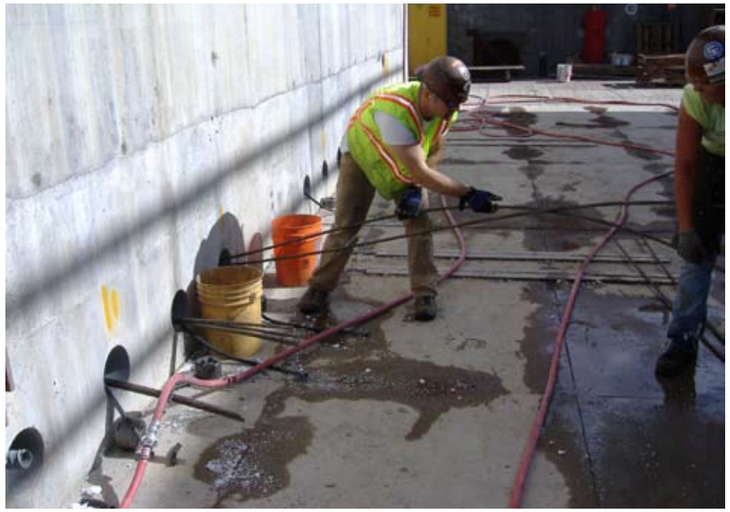
The process is completed for each steel rod and cable starting with the vertical tendons, moving on to the transverse and finishing with the longitudinal.

1. Place hollow metal ducts in the pontoons. Keeping the ducts straight and round during installation is essential to be able to push the tendons through the ducts.
2. Pour concrete around and over the ducts. Inspectors carefully watch during concrete pours to make sure the ducts stay free from concrete. Once the concrete cures, or hardens, the ducts are firmly fixed in place.
3. Insert the tendons (steel ropes made up of steel cables) into the hollow tubes using a hydraulic pusher. This equipment looks like a baseball pitching machine. Its rubber tires spin, catch the cable and insert it into the ducts.
4. Attach an anchor plate to both ends of the metal ducts. These plates secure the tendons in place. Each plate must be level so equipment can sit on it during the operation.
5. Place wedges on each strand. Inside the wedges are small teeth-like objects which grab the strands. The wedges grab the steel tendons and hold them in place. As the tendon is stretched, it tries to pull back, securing itself in place.
6. Attach a hydraulic ram and pull the tendons tight. Crews must tighten the tendons slowly and carefully to stretch the tendons to the right length without damaging the tendon or the concrete pontoon. The pounds of pressure applied to each type of post tensioning are:

   Longitudinal .....835,000 lbs.
   Transverse..... 176,000 lbs.
   Vertical..... 178,000 lbs.

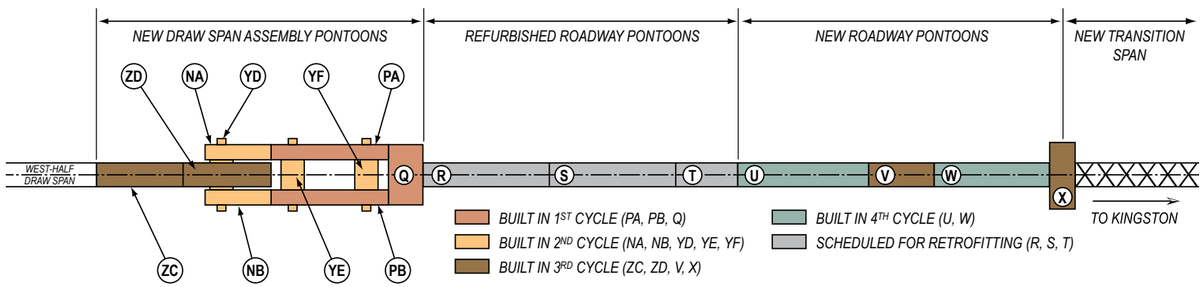
7. Cut off the excess tendon sections so the entire tendon will be covered by concrete and protected from the elements.
8. Install a grout cap on the anchor plates, mix cement grout and pump it inside the duct and around the tendons. This grout protects the steel strands from corroding. The grout cap is removed after 24 hours.

Once the post tensioning process is complete, workers can install rebar around the top of the post tensioning duct and pour concrete. Crews can then move forward to accomplish the final pontoon construction tasks that need to be completed before float-out.



Workers insert tendons (steel ropes made up of steel cables) into the hollow tubes that run from wall to wall through the pontoon PA floor, August 29, 2006.

Birds-eye View of New East-half



Financial Status

Project Cost Summary

Period Ending August 31, 2006

CATEGORY	BUDGET	EXPENDED	% EXPENDED
Original Commitments			
Port Angeles	$83,000,000	$82,877,000	100%
Bridge Site Work	$41,463,000	$37,844,000	91%
Work in Progress	$81,600,000	$67,891,000	83%
Subtotal Original Commitments	$206,063,000	$188,612,000	92%
Modified Commitments			
WSDOT Construction Management	$32,036,000	$5,696,000	18%
Bridge Closure Mitigation	$9,644,000	$692,000	7%
New Facilities & Bridge Completion	$223,225,000	$28,677,000	13%
Subtotal Modified Commitments	$264,905,000	$35,065,000	13%
Project Total	$470,968,000	$223,677,000	47%

Planned vs. Actual Expenditures

Period Ending August 31, 2006